SLIC SUPER LIGHTWEIGHT INTERCHANGEABLE CARRIER

ROBERT C. BYRD INSTITUTE

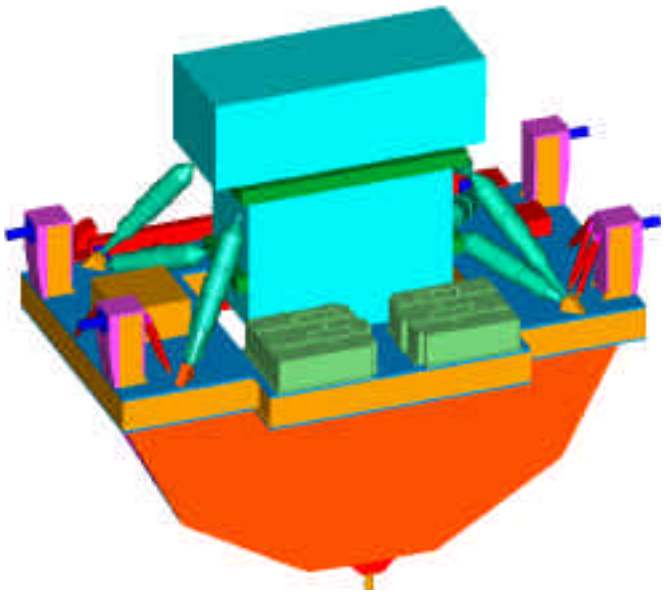
WEST VIRGINIA UNIVERSITY FMW COMPOSITES

The Super Lightweight Interchangeable Carrier (SLIC)

TRIMMING POUNDS, GAINING STRENGTH

Each time astronauts upgrade to the Hubble Space Telescope, the new instruments and components ride to orbit on specialized pallets called carriers. These pallets cradle Hubble's precious new cargo in the Space Shuttle's payload bay, protecting it from the stress of launch and the trip to orbit. They also serve as temporary parking places for hardware during spacewalks. Once the mission is complete, they provide storage space and protection for the old equipment's journey back to Earth.

These large carriers—which span the width of the payload bay—add thousands of pounds to the weight of the Shuttle. Since the fully loaded vehicle cannot exceed a maximum weight limit, every pound trimmed from a carrier is one more pound that can be used for science instruments or fuel.



SLIC in Hubble Servicing Configuration

Eager to launch as much science equipment as possible, the Hubble Space Telescope team is currently designing the Super Lightweight Interchangeable Carrier (SLIC). By using state-of-the-art composites and a more structurally efficient design, engineers have dramatically increased performance and load-carrying capability while significantly reducing weight.

SLIC is made of carbon fiber with a cyanate ester resin and a titanium metal matrix composite. This flat, reusable pallet looks much like the carriers flown on previous Hubble servicing missions, but SLIC's composite construction makes it much lighter and stronger than traditional aluminum carriers. Compared to other Hubble equipment carriers, SLIC shows a dramatic increase in performance.

SLIC's modular design and removable top deck allow the carrier to be customized for different types of missions. For Hubble servicing, the deck will be removed and replaced with a panel featuring a cutout to accommodate a science instrument in a protective enclosure. For an International Space Station mission, a solid upper deck and wings could be added to the deck to increase the mounting surface. And for on-orbit satellite retrieval and repair, a berthing ring would be added to hold the captured satellite.

SLIC Capabilities and Characteristics

- Lightweight composite structure: 1200 lb
- Current payload weight: 4500 lb
- Size: 180" x 90"
- Platform on Orbiter: 393"
- Longeron trunnion spacing: 62.94"
- Structurally interchangeable: Wings can be added on to increase deck size.
- Honeycomb surface can accommodate various payloads using post-bonded inserts.
- Compatible with all Hubble carrier avionics

Carrier	Structure Weight (lb)	Load Capability(lb)	Performance (Load Capability/Weight)
Second Axial Carrier (SAC)	1950	3600	1.85
TAPS Support Structure (TSS)	3300	6000	1.82
Super Lightweight Interchangeable Carrier (SLIC)	1200	7200	6.0

APPLICATIONS FOR THE SLIC CARRIER

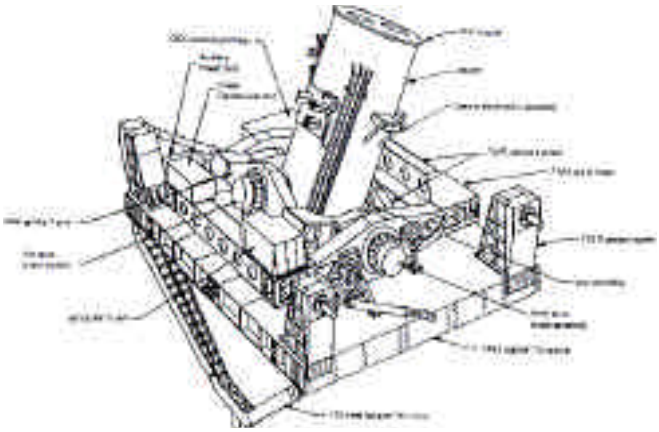
Losing Weight to Keep Hubble Healthy

Although Hubble's mission was extended to 2010, its last service call is scheduled for 2004. To keep the telescope healthy and productive until decommissioning, NASA wants to reboost Hubble to a higher orbit and leave it with as much new and advanced equipment as possible. To accomplish this, Hubble's team designed SLIC.

Weighing in at a mere 1200 lb, SLIC will carry Hubble's newest camera, the 1000 lb Wide Field Camera 3, which will ride to orbit in a 800 lb protective enclosure. SLIC will also carry a 500 lb radiator and two new batteries, each weighing 500 lb.

Retrieving and Servicing Satellites

The versatile SLIC pallet is ideal for missions to retrieve, repair or upgrade satellites in orbit. In this role, SLIC would sport a rotating berthing mechanism to hold the captured satellite. The Shuttle's robotic arm would pluck the satellite from orbit, berth it on SLIC in the payload bay, and rotate it to whatever position affords the astronauts the best access.



SLIC as a Science Platform for Space Telescope

SLIC could also secure the satellite in the Shuttle's payload bay for a trip back to Earth.

Carrying Cargo to Space Station

SLIC is also being designed to carry equipment for the International Space Station. The pallet would ride to orbit in a Space Shuttle's cargo bay. Once the Shuttle docked, astronauts could retrieve the mission-unique equipment and send SLIC back with the Shuttle. In another scenario, the Space Station's robotic arm would grasp SLIC's grapple fixture and mount the entire pallet to the station's exterior truss. SLIC and its cargo could sit outside the Space Station until needed. The pallet could be returned to Earth on another Shuttle and be reused in a future mission.

Serving as a Science Platform

Perched on the Space Station's truss, SLIC could also serve as a platform for space telescopes and experiments. Its load isolation dampening mechanisms would quiet the vibrations of Space Station environment and provide a steady perch for sensitive equipment. Wings could be added to SLIC's deck to increase the mounting surface.

For more information on SLIC, contact:
Mr. Frank Cepollina
Code 442
NASA/Goddard Space Flight Center
Greenbelt, MD 20771
301-286-1266
Or visit the Hubble Project website at:
http://hubble.nasa.gov

National Aeronautics and Space Administration

Goddard Space Flight Center
Greenbelt, Maryland